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MACHINE LEARNING APPROACHES FOR PREDICTING THYROID CANCER RECURRENCE: ACCURACY AND FEATURE IMPORTANCE ANALYSIS

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Thyroid cancer, particularly its differentiated forms like papillary and follicular carcinomas, is often characterized by an excellent prognosis and high long-term survival rates. However, accurately predicting the risk of cancer recurrence remains a critical challenge for optimizing patient care. In this study, we harnessed the power of machine learning to analyze real-world clinical data from thyroid cancer patients, aiming to improve recurrence prediction and support personalized treat-ment strategies. Our dataset included a wide array of variables, such as tumor classification (T stage), lymph node involvement (N stage), distant metastasis (M stage), overall cancer staging, histopathological characteristics, and metrics assessing response to initial treatment. Among the algorithms tested, the XGBoost model stood out for its exceptional ability to capture intricate, non-linear relationships and interactions among the variables, delivering robust predictive performance. When combined with the response to initial therapy, the XGBoost model achieved a remarkable test accuracy of 98.7%, highlighting the pivotal roles of these two factors in forecasting recurrence.